

Table 5.1. Results of Enzyme Studies by Claude Hogeboom, Hotchkiss, & Hoagland from the Annual Report for 1943–1944

Type of Enzyme	Substrate	Supernate	Large Granule	Microsomes
Nuclease + Phosphatase	Nucleic Acid	0	+++	+++ ¹
Ribonuclease	Nucleic Acid	0	+++	+
Phosphatase	Nucleic Acid	0	+++	Trace
Phosphatase	Phosphate esters and ATP	0	+	Trace
Nucleopyridinase	Coenzyme I	0	+	+++
Cytochrome Oxidase	Ascorbic Acid	0	+++	Trace
Succinoxidase	Succinic Acid	0	+++	Trace
Dehydrogenase	α -glycerophosphate	0	+++	Trace
Oxidase	d-amino Acids	0	+++	0
Phosphate Transfer	ATP to Phosphate esters	+++	Trace	0
Catalase	Peroxide	+++	+	Trace
Malic Dehydrogenase	Malic Acid	+++	Trace	Trace
Coenzyme I	(as growth factor)	+	++	+

found only in what they referred to as the secretory or large granule fraction. In the *Annual Report* for that year, Claude indicated an intention to extend the investigation to other enzymes. These studies, involving Claude, Hogeboom, Hotchkiss, and Charles L. Hoagland, began in earnest in 1943–4 and Table 5.1 shows their results (as stated in the *Annual Report* for that year).

During the following year, these studies, except for investigations into ribonuclease, were suspended as Hogeboom was diverted to war-related research. When Hogeboom finally returned in September 1945 there was a critical change in the way the investigators pursued this research. In addition to simply indicating how much activity a particular fraction exhibited, the researchers compared the amount of activity quantitatively with the amount exhibited by the initial extract (the supernatant from which tissue debris, free nuclei, and red blood corpuscles had been removed in the initial centrifugation). This was done using the Warburg manometer to supply a substrate (e.g., succinic acid salt) to the fraction and determine the resulting rate of oxygen gas uptake. This rate was taken as a measure of the extent to which the relevant enzyme or enzyme system was present and active in the fraction. For example, succinic acid salt provided a measure for succinic oxidase (the enzyme